Photonic Lanterns for Optical Communications

Completed Technology Project (2017 - 2018)

Project Introduction

We propose to investigate the use of photonic lanterns for free space optical communications. Photonic lanterns have the potential to provide a pathway to lowering the cost and complexity of future optical ground stations by eliminating the need for extremely costly Adaptive Optics. In coherent optical communications, they also offer the possibility of arraying small low cost receive telescopes to provide greater collection area at much lower cost than a single large aperture receiver.

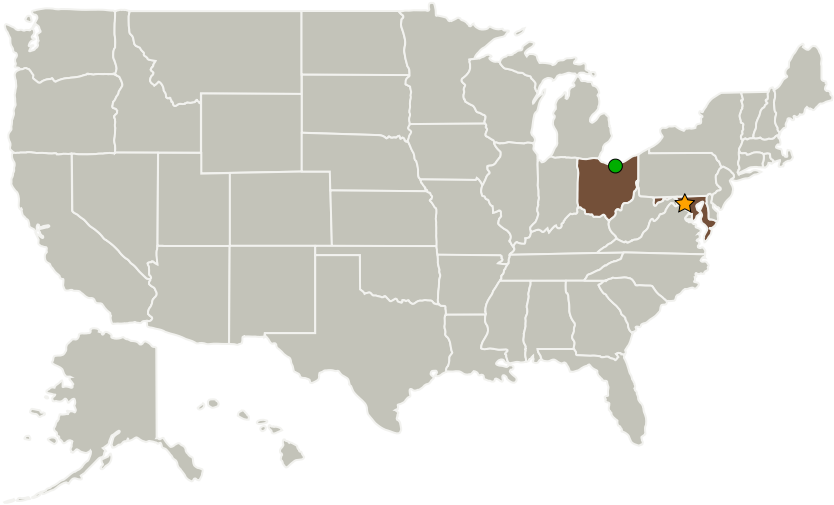
Anticipated Benefits

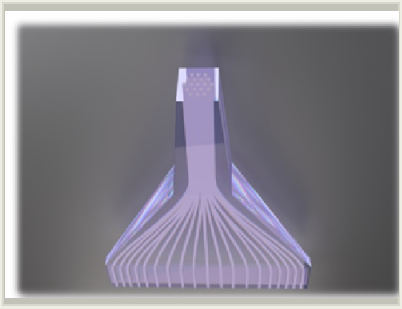
Photonic lanterns will possibly allow us to collect the signal from a laser communication downlink and couple it to single mode fibers without the use of Adaptive Optics.

By eliminating the need for adaptive optics on ground terminals, the cost and complexity would be greatly reduced. It is hoped that this proposed work could eventually be used in subsequent years to create a demonstration ground receiver for LCRD, or some other NASA laser communications mission.

By starting this work now, we have the possibility of developing it in time to demonstrate it with LCRD when it comes online and also possibly demonstrating it on the upcoming ORION lasercom mission.

Primary U.S. Work Locations and Key Partners





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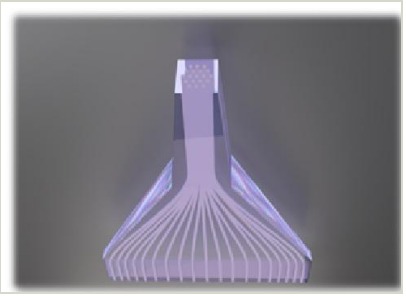
Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland
●Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations	
Maryland	Ohio
Outside the United States	

Images



Photonic Lantern
PL
(https://techport.nasa.gov/image/28280)

Organizational Responsibility

Responsible Mission Directorate:
Mission Support Directorate (MSD)

Lead Center / Facility:
Goddard Space Flight Center (GSFC)

Responsible Program:
Center Independent Research & Development: GSFC IRAD

Project Management

Program Manager:
Peter M Hughes

Project Managers:
Terence A Doiron
Timothy D Beach
Lavida D Cooper
Jason M Mitchell

Principal Investigator:
Robert E Lafon

Co-Investigators:
Sarah A Tedder
Armen Caroglanian

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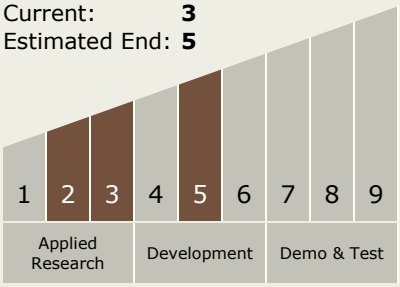
Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **5**



Technology Areas

Primary:

- TX05 Communications, Navigation, and Orbital Debris Tracking and Characterization Systems
  - TX05.1 Optical Communications
    - TX05.1.5 Atmospheric Mitigation

Target Destinations

The Moon, Mars, Others Inside the Solar System

Supported Mission Type

Planned Mission (Pull)